Technical Disclosure Commons

Defensive Publications Series

April 09, 2018

Directed Messages with Natural Identifiers

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DIRECTED MESSAGES WITH NATURAL IDENTIFIERS

Introduction

The present disclosure provides systems and methods to enable inter-room messaging using devices (e.g., smart speakers, home assistants, etc.) located around a physical location (e.g., office, business, building, etc.) where messages are addressed to a recipient and not a specific room location. Physical limitations in an environment (e.g., office, business, building, etc.) can make communication among location members (e.g., office staff, business associates, members, etc.) difficult. Often, location members may be located in different rooms and sound may not adequately carry from one room to another, making direct communication between location members problematic without moving from one room to another. As an example, an individual may be in one room working and may want to communicate with others in a distant room. In such a situation, the individual may either have to shout and hope that they are heard or leave the current room and move to the other room to overcome the problem of their voice not carrying to the distant room. The systems and methods of the present disclosure can enable a user to simply input a target recipient and message to a device (e.g., smart speaker, home assistant, etc.) in a first location (e.g., office, other room, etc.) and the message can be intelligently routed around the physical location (e.g., office, business, building, etc.) to another device (e.g., smart speaker, home assistant, etc.) located in the current location (e.g., room) of the recipient.

Summary

According to an aspect of the present disclosure, a plurality of devices, such as smart speakers, home assistants, and/or the like, can be located around a physical location, such as an office, business, and/or the like. The devices can be registered together as part of a location

group (e.g., office group, business group, household group, etc.) and members of the location (e.g., office staff, business associates, members, etc.) can be enrolled with a device within the location group, providing the user access to all devices in the location group. Each device can monitor for human speech within the surrounding environment (e.g., room) and attempt to identify individual members located within the room based on the detected speech, for example, by matching personal speech profiles associated with individual members. The devices of the location group can use the identified individual member locations to route messages from a sender to a recipient without requiring the sender to know the current location of the recipient.

Detailed Description

According to an aspect of the present disclosure, systems and methods can combine multiple devices, such as smart speakers, home assistants, and/or the like, located throughout a physical location environment, such as an office, business, and/or the like, with intelligent voice matching capabilities to enable inter-room messaging between location members in a familiar manner by addressing the recipient and not the room they are located in. The present disclosure allows for routing messages around a physical location and providing the messages to individuals wherever they are currently located. In some implementations, a system can be used to send messages as sound bites and/or as a way to initiate full two-way audio communication.

As one example, a first device (e.g., speaker 1) can be located in a first room and a second device (e.g., speaker 2) can be located in a second room at some distance from the first room. Alice and Bob are registered as members of a group associated with the physical location. Alice is in the second room and Bob is in the first room, and Bob wants to let Alice know that she is needed in the first room. Bob speaks out load within range of speaker 1, “Tell Alice that she is needed in my office.” Speaker 1 determines that Alice is in the second room and routes

the message to speaker 2 in that room. Speaker 2 reads out "Hi Alice, Bob needs you in his office." In some implementations, the speaker can alternatively inform Alice that there is a message for her and let her decide whether to instruct the speaker to read out the message.

According to an example implementation of the present disclosure, the devices (e.g., smart speakers, etc.) can comprise a powered speaker with a microphone and local computational processing capability and that can communicate via a local network and/or the like. The devices can be located around the physical environment to provide good coverage of the physical location (e.g., office, business, building, etc.). The devices (e.g., smart speakers, etc.) can be registered together to comprise a location group and allow for generating a graph of the physical location (e.g., office, business, building, etc.).

In some implementations, members of the location (e.g., office staff, business associates, members, etc.) can enroll with any of the speakers in the location group and gain access to all the speakers in the location group. For example, location members can enroll by signing in to the location group at one of the speakers with an existing user account identifier. In some implementations, messaging using the location group devices can be limited to a small group, the location members, and natural identifiers, such as a person's first name, nickname, title, and/or the like, could be used to direct messages to recipients and reduce the need for less comfortable disambiguation (e.g., "Tell {first name}…" versus "Tell {first name} {last name}…").

According to another aspect of the present disclosure, a personal speech profile (e.g., voice identifier) can be created for each registered member that can allow for identification of the user by features of their voice and speech patterns. In some implementations, the voice identifier can be used in combination with other attributes and/or signals, such as hardware identifiers (e.g., Bluetooth identifiers, Wi-Fi identifiers, etc. from a phone, wearable device, etc.)

to identify which users are within audible range of a device (e.g., smart speaker, etc.). In some implementations, a voice identifier can be used as the final signal to confirm the location of the user, for example, where a user may set their user device (e.g., phone, etc.) down and then leave the room.

More particularly, each of the devices (e.g., smart speakers, etc.) in a location group can listen for audio (e.g., human speech) to identify one or more individuals currently in the room where the device is located. For example, in some implementations, a device can listen for sound within a room and first determine if there is human speech detected in the room. If human speech is detected, the device can compare the detected speech to stored personal speech profiles (e.g., voice identifiers) for the registered members to determine whether one or more individuals in the room can be identified. If the detected speech matches an existing profile, the device can update a current location for the member associated with the profile, such as by indicating the location of the member in reference to a graph of the location (e.g., office, business, building, etc.), and the individual's location information can be accessed by other devices within the location group. If the detected speech does not match an existing profile, in some implementations, the device can indicate that an individual who is not a location member (e.g., a visitor) is located within the room and can modify the device behavior accordingly (e.g., not reading messages straight out when a visitor is in the room, etc.). In some implementations, the devices can filter out audio from non-human sources, such as television or radio broadcasts. Additionally, in some implementations, the devices can have an awareness of social context and be able to disambiguate between situations with different members of the location together.

By knowing where various location members are currently located within the physical location (e.g., which device is located most closely to an individual), the systems and methods of

the present disclosure can intelligently route messages around the location without the message originator needing to know where the recipient is currently located, thereby providing a simple communication system for users requiring little learning and minimal interaction. Users can just announce who they want to communicate with in the physical location and the system can locate the recipient and open a message channel to a device co-located near the recipient.

In some implementations, the systems and methods can provide for detecting whether non-registered individuals are located within audible range of a device (e.g., smart speaker, etc.), for example, a friend who is not a member of the office but is just visiting. The present disclosure provides for the ability to disambiguate between different situations with regard to the presentation of messages to a recipient. For example, if there is only one member in the room it may be suitable to read the message straight out, however, if there are multiple people in the room, different behavior may be triggered. As an example, if there is a visitor in the room, the device may announce that there is a message for the recipient instead of immediately broadcasting the actual message. In some implementations, a default expectation may be that the messages are private (e.g., rather than burdening the sender with determining whether the message should be immediately read out or determining if the message is appropriate for visitors in a room). Accordingly, the devices can indicate that a message is available for the recipient, and the recipient can decide whether to allow the device to read out the message.

According to another aspect of the present disclosure, the entire communication process can happen within the physical location (e.g., office, business, building, etc.) such that user data need not leave the physical location. For example, the recognition of users may be performed locally to the devices within the physical location increasing privacy and reducing any need to broadcast or store the location of users outside of the physical location. The speaker

identification, knowledge of user locations, and messages can all remain local to the group devices within the physical location, thereby improving privacy and security.

While the present disclosure describes use of the systems and methods in an office environment for convenience, the systems and methods are not limited to such. The systems and methods of the present disclosure can be configured for use in any multi-room scenario, such as a home, office, other building, and/or the like.

Figure 1 depicts an example office 100 according to an implementation of the present disclosure. The office 100 may comprise a plurality of rooms, such as room 102, room 108, room 112, and room 118. The office 100 may have a plurality of devices, such as smart speakers, home assistants, and/or the like, located throughout the office 100 to provide good coverage of the office 100. For example, a smart speaker 104 may be located in room 102, smart speaker 110 may be located in room 108, smart speaker 114 may be located in room 112, and smart speaker 120 may be located in room 118. In some implementations, the smart speakers 104, 110, 114, and 120 may comprise part of a location network system. The smart speakers 104, 110, 114, and 120 can be registered together to comprise a location group.

A plurality of office members, such as member 106 and member 116, can be enrolled with any one of the smart speakers, gaining access to the entire location group (e.g., all of the smart speakers). In some implementations, a personal speech profile can be generated for each registered member and stored (e.g., within one or more devices of the location group) to allow for identification of the members by features of their voices and speech patterns.

According to the example implementation, member 106, located in room 102, may wish to relay a message to member 116, located in room 112, without moving between the rooms. Member 102 may input (e.g., speak aloud) a recipient identifier for member 116 (e.g., a natural

identifier such as recipient's first name, title, and/or the like) along with the message intended for member 116 to the smart speaker 104 co-located in room 102. Smart speaker 104 may retrieve the current location of member 116. For example, smart speaker 114 may have identified that member 116 is located in room 112 based at least in part on matching speech of member 116 with a stored voice identifier associated with member 116, and smart speaker 114 may have updated the location of member 116, for example in reference to a graph of office 100. Smart speaker 104 may then route the message from member 106 to smart speaker 114 in room 112. Smart speaker 114 may then announce that there is a message for member 116 and/or broadcast (e.g., read out) the message for member 116.

Figure 2 depicts a flowchart illustrating example operations 200 for routing messages around a physical location in accordance with aspects of the present disclosure. Although operations 200 are shown and described in a particular order for purposes of illustration and discussion, the operations are not limited to the particularly illustrated order or arrangement and certain operations can be performed in different orders or simultaneously.

The operations begin at block 202 where a message is generated at a first device, such as a smart speaker and/or the like. For example, a first registered user may wish to communicate a message to a second registered user located elsewhere within a physical location (e.g., in a different room of an office, business, building, etc.). The first user may speak the name of the target recipient (e.g., the second registered user) along with the message within audible range of the first device co-located in the room with the first user. At block 204, the first device may determine the recipient of the message to be the second user.

At block 206, the first device may determine the current location of the second user, for example by determining the closest device to the second user (e.g., a second device co-located in

the room where the second user is currently located). For example, the first device may query information indicative of locations of members stored by devices within the location group of which the first device is a member. In some implementations, each of the devices within a location group can monitor their surrounding environment for human speech and attempt to match detected speech to identify members located nearby the device and store location data for the members that can be accessed by other devices within the location group.

At block 208, the first device may provide the recipient and message to the second device (e.g., a device closest to the second user/recipient). At block 210, the second device may provide the message to the second user, for example, by broadcasting (e.g., reading out) the message or announcing that a message is available for the second user.

Further to the descriptions above, a user may be provided with controls allowing the user to make an election as to both if and when systems, programs, or features described herein may enable collection of user information (e.g., information about a user's preferences, a user's current location, a user's social network, social actions, activities, or profession, etc.), and if the user is sent content or communications from a server. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized where location information is obtained (such as to a city, ZIP code, or state level), so that a particular location of a user cannot be determined. Thus, the user may have control over what information is collected about the user, how that information is used, and what information is provided to the user.

Figures

Figure 1

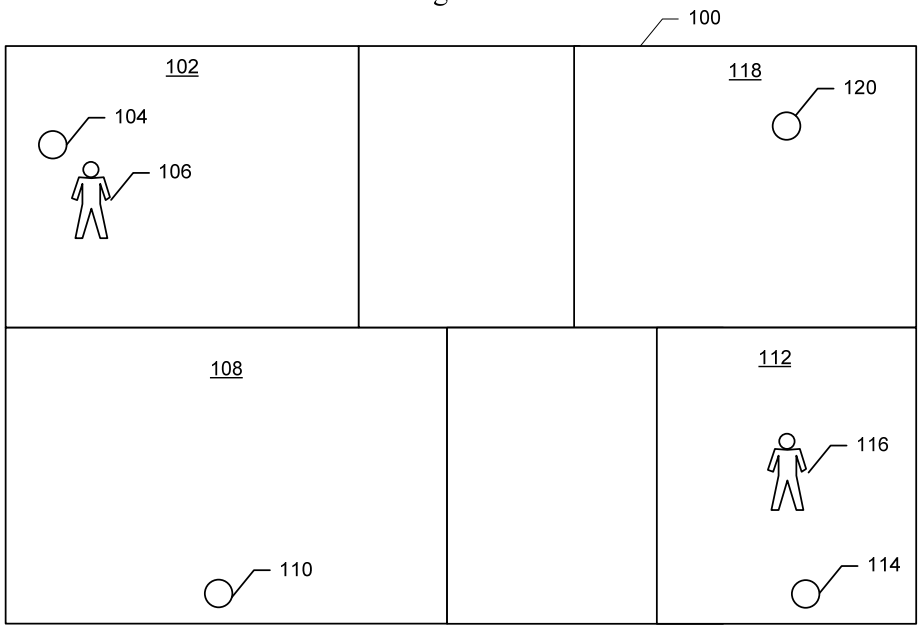
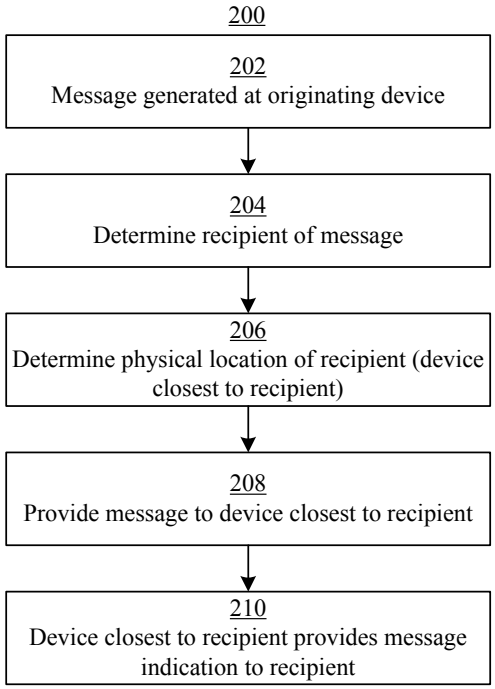


Figure 2



Abstract

The present disclosure describes systems and methods that provide for routing messages among devices located around a physical location without requiring the sender to know the current location of the recipient. More particularly, the present disclosure provides for combining a plurality of devices, such as smart speakers, home assistants, and/or the like, located around a physical location, such as an office, building, and/or the like, with intelligent voice matching capabilities to enable inter-room messaging by addressing the individual recipient without needing to know the room they are currently located in. In some implementations, the devices can monitor their surroundings for human speech and identify location members within audible range of the device using voice identifiers, such as voice features and/or speech patterns stored in personal speech profiles. The devices can use the identified member locations to provide for routing messages between members among the devices located in the physical location.